

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph numbered [0013] with the following paragraph:

[0013] As diagrammed in FIG. 1, a wastewater treatment system 10 is provided for processing raw sewage and graywater on-board a marine vessel[[.]] ~~Wastewater is generated onboard from~~ to form several different sources 12[[.]] of wastewater that is fed into ~~from which a~~ feed collector component 14 is supplied. ~~Such wastewater sources include sewage and graywater, specific~~ Specific fractions of ~~which the sewage and graywater within the wastewater from the~~ sources 12 vary in accordance with the generation thereof. The feed collector 14 supplies the wastewater to a bioreactor 16 component[[.]] 16 within ~~in~~ which biological pre-treatment of organic matter takes place. Following such bioreactor pre-treatment, membranes located in the bioreactor 16 separate solids and bacteria from a clean effluent stream . [[.]] ~~which is~~ The separated solids and bacteria are fed to into a permeate extraction component unit 20[[.]] by ultraviolet ~~Ultraviolet light is used in the component 20 to produce~~ producing an effluent 22 suitable for overboard discharge. Non-biodegradable material is separately removed automatically from the bioreactor 16 as sludge 18 to maintain necessary conditions for continued treatment. Operation and control of the feed collector 14, the bioreactor 16 and the permeate disinfecting extraction component 20 are achieved by means of a programmable logic controller (PLC) 23, and through which all components of the system 10 are supplied with electricity from a power supply 24.

Please replace paragraph numbered [0014] with the following paragraph:

[0014] As diagrammed in more detail in FIG. 2, the bioreactor component 16 of the system 10 includes a tank 26, which of roughly has a 1100 gallons capacity for giving the system 10 a 75-person size capacity system. Aeration is supplied by duty and back-up blowers 52 through a network of diffusers 28 located at the bottom of the tank 26, to sustain the bacterial population therein. Any foam that is generated in the bioreactor tank 26 as a byproduct of treatment flows by gravity into a foam collection tank 29, wherein it collapses and is pumped by a positive displacement foam condensate pump 82 back into the bioreactor tank 26. The foam tank 29 is approximately 200 gallons in capacity for the same 75-person size system 10 and is vented to atmosphere at an overboard connection via a vent 94. Located inside the bioreactor tank 26 is a membrane module assembly 30, which extracts clean permeate from the biomass through filtration for delivery through plumbing conduit 34 to the permeate disinfection unit 20. A positive displacement sludge pump 32 removes non-biodegradable sludge 18 from the bioreactor tank 26 automatically, and pumps it either overboard, to a holding tank, or to an onboard concentration or destruction device such as an incinerator depending on the ship's location.

Please replace paragraph numbered [0015] with the following paragraph:

[0015] As shown in FIG. 3, the permeate disinfection unit 20 ~~consists of~~ connected by the plumbing conduit 34 ~~from~~ to the bioreactor 16, has two positive displacement duty and backup permeate pumps 36 and an ultraviolet disinfection unit 38 connected to the discharge piping 22. The permeate pump 36 draws permeate through the membranes in the bioreactor 16 at a sub-atmospheric pressure and delivers the flow to the ultraviolet unit 38. Operation of the ultraviolet unit 38 is controlled by the controller 23[[,]] ~~and the unit 38 is~~ when energized whenever while the treatment system 10 is processing wastewater. Permeate flows over baffles inside the ultraviolet unit 38 to ensure adequate residence time for disinfection, and is directed through the plumbing 22 for the overboard discharge of the effluent 22.

Please replace paragraph numbered [0016] with the following paragraph:

[0016] As diagrammed in greater detail in FIG. 4, the feed collector component 14 includes a tank 50, ~~with~~ having a capacity of 750 gallons for the same 75-person system 10. Aeration from the same two blowers 52 that supply the bioreactor tank 26 also supply an array of diffusers 40 ~~in~~ at the bottom of the tank 50, for the purpose of preventing anoxic conditions in the tank 50 which could disrupt treatment system performance. The tank 50 is vented to atmosphere at an overboard connection via the vent line 94. Sewage and graywater from the onboard wastewater sources 12 supply the feed tank 50. Macerator feed pumps 68 (one duty, one backup) circulate raw wastewater within tank 50 to ensure mixed contents and reduce the size of solids particles. Based on a level demand signal from the bioreactor 16, feed is supplied by the macerator pumps 68 to the bioreactor 16 for treatment.

Please replace paragraph numbered [0017] with the following paragraph:

[0017] An "Auto/Maintenance/Off" selector switch 92 as diagrammed in FIG. 5 allows the selection of one of four operational modes of the system 10 operation, including Off, Automatic process, Automatic Standby, and Maintenance. When the system 10 is in the OFF mode (selector switch 92 in OFF position) all power to components 14, 16 and 20 is secured. All of the pumps 36, 68 and 82, blowers 52, and the UV unit 38 remain off. In the AUTO position of the selector switch 92, the automatic process mode is initiated which includes both the normal process and standby modes. In such process mode, a graphical user interface (GUI) associated with the controller 23 indicates when the working level in the feed tank 50 is reached. The macerator pump 68 as diagrammed in FIG. 4 automatically starts and circulates wastewater in the feed tank 50, delivering wastewater to the bioreactor 16 when there is a demand based on the level switches in the bioreactor 16. Pressure transducers monitor the macerator pump 68 discharge pressure for alarm and shutdown conditions due to low discharge pressure or high pressure. The bioreactor 16 receives feed from the feed tank 50. When the working level switch is reached in the bioreactor 16, the PLC 23 waits a set period of time, to allow the bioreactor level to drop. The macerator pump 68 then feeds water to the bioreactor 16 as hereinbefore indicated. During such cycle, the system 10 automatically switches between 8 minutes of permeation and 2 minutes of rest. One of the two blowers 52 will always be operating during automatic operation. Programming is provided to automatically switch all the redundant pumps and blowers from the duty pump 68 or blower 58 to the backup unit in case of failure. This cycle continues as long as the system 10 is in the automatic mode and there are no alarm conditions. The system 10 is accordingly designed to operate 24 hours per day.

Please replace paragraph numbered [0020] with the following paragraph:

[0020] A maintenance mode is established through the power control ~~component~~ diagrammed in FIG. 5 so as to assist with troubleshooting whereby certain portions of the operation cycle may be initiated manually through a the selector ~~switch~~ control switch panel 92 connected to the power supply 24 through the controller 23. Maintenance personnel can thereby take redundant equipment out of service, reset run hours for selected key equipment, and choose from several standard maintenance tests. Maintenance test screens provide several pushbuttons for an operator to test the following functions:

- Direct Fill Test - One complete wastewater feed cycle is performed.
- Concentrate Test - Operates sludge concentrate pump for specified time interval.
- Permeate Test - One, 8 minute permeate/2-minute rest cycle is performed.
- Standby Test - System standby components are operated until turned off by operator.
- Startup Test - 48-hour period of aeration and mixing in feed tank. Conditions raw graywater in preparation for system startup.
- Long Term Standby Test - Similar to standby Test, but blower is on for 5 minutes, off for 15 minutes.